SECTION 709
METALS

709.1-STEEL BARS FOR CONCRETE REINFORCEMENT:

All bar reinforcement, whether deformed or plain, shall meet the requirements of AASHTO M 31 or M 42. Bars shall be of a deformed type, unless otherwise specified. All reinforcement for use in structures shall be labeled to correspond with marks on the Plans before being shipped to the job site.

When reinforcing steel material is furnished by a supplier who is not certified under provisions of MP 709.01.50, the supplier shall at their expense be required to have each heat or lot of material to be furnished to the Division, sampled by a Division approved inspection agency in accordance with MP 700.00.01 and shall have the samples tested for compliance with the governing specification by a Division approved laboratory. The test and inspection information shall be furnished in the Division approved computer acceptable format.

Epoxy coated reinforcing steel shall meet the requirements of AASHTO M 284. Except that Section 12.2 of AASHTO M284, shall be deleted and replaced with the following. The Contractor shall repair any damage to epoxy coating of reinforcing steel that occurs during the shipment, storage and installation of the steel. The sum of all damage areas in each one foot (300 mm) length of bar shall not exceed two percent of the bar area. The total bar surface area covered by patching material shall not exceed five percent.

709.1.1: All bar reinforcement, whether deformed or plain, shall meet the requirements of AASHTO M 31 or M 42. Bars shall be of a deformed type, unless otherwise specified. All reinforcement for use in structures shall be labeled to correspond with marks on the Plans before being shipped to the job site. When reinforcing steel material is furnished by a supplier who is not certified under provisions of MP 709.01.50, the supplier shall at their expense be required to have each heat or lot of material to be furnished to the Division, sampled by a Division approved inspection agency in accordance with MP 700.00.01 and shall have the samples tested for compliance with the governing specification by a Division approved laboratory. The inspection and test data shall be provided to the Contract Administration Division for verification of specification compliance.

709.1.2-Epoxy coated reinforcing steel shall meet the requirements of Section 709.1.1 and AASHTO M 284. When epoxy coated reinforcing steel is furnished by a coater who is not certified under the provisions of MP 709.01.51, the supplier shall be required to have the material tested at their own expense. Sampling shall be done by a Division approved inspection agency in accordance with MP 700.00.01. The samples shall be tested for compliance with the governing specification by a Division approved laboratory. The inspection and test data shall be provided to the Contract Administration

Division for verification of specification compliance.

709.2-PRESTRESSING REINFORCEMENT:

Prestressing reinforcement shall be high-tensile steel wire conforming to AASHTO M 204, high-tensile wire strand conforming to AASHTO M 203, or high-tensile-strength steel bars conforming to AASHTO M 275.

709.3-BLANK

709.4-WELDED WIRE FABRIC FOR CONCRETE REINFORCEMENT:

Welded wire fabric for concrete reinforcement shall conform to the requirements of AASHTO M 55, except as modified.

Fabric reinforcement for pavement shall be not less than 5 feet (1.5 meters) in width and shall be shipped in sheets and not in rolls. Fabric for slope protection, gutters and miscellaneous items may be shipped in rolls. Sheets shall be bent in the shop as shown on the Plans. Epoxy coated welded wire fabric for concrete reinforcement shall meet the requirements of ASTM A 884/A 884M.

709.5-EXPANDED METAL PAVEMENT REINFORCEMENT:

Expanded metal pavement reinforcement shall be made from open-hearth mild steel plates by a cutting and drawing process to form a uniform diamond shape mesh. The weight per 100 sq. ft. (10 square) and size of the meshes shall be as specified on the Plans. The strands or members shall be clean cut, straight and uniform in size. A bend test specimen cut from the furnished fabric shall withstand bending cold through 180 degrees flat upon itself without cracking on the outside of the bent portion. A tensile specimen cut from the furnished material shall have a minimum tensile strength of 55,000 psi (380 MPa). The chemical composition of the steel shall conform to SAE Standard No. 1010.

709.6-FABRICATED BAR OR ROD MATS FOR CONCRETE REINFORCEMENT:

Fabricated steel bar or rod mats shall conform to the requirements of AASHTO M 54.

709.7-JOINT TIE BOLT ASSEMBLY:

Joint tie bolt assemblies shall conform to the applicable details of the Standard Detail Book, Volume I. The bar used shall conform to the requirements of ASTM F432, Grade 55. The tensile strength of the assembly shall be not less than 15,000 lb. (65 kN) The coupling or shank of the hook bolt shall provide a positive stop to prevent the shank of the hook bolt from being threaded beyond the center of the coupling. The tie bolt assemblies shall be equipped with an approved fastener for installation of the assembly in the steel pavement form. The fastener shall hold the assembly in the designated position

during the placing and finishing of the concrete and subsequent removal of the pavement forms without damage to the concrete or the tie bolt assembly.

709.8 - HIGH STRENGTH LOW ALLOY STRUCTURAL METAL:

High-strength structural steel for bridges shall conform to AASHTO M270, grades 50, 50W or 70W. High-strength steel for all other applications shall conform to AASHTO M222 (weathering) or AASHTO M223.

709.9-BLANK

709.10-GRAY IRON, MALLEABLE IRON AND DUCTILE IRON CASTINGS:

Gray iron castings shall conform to the requirements of AASHTO M 105, Class No. 30.

Malleable iron castings shall conform to the requirements of ASTM A 47, Grade 32510. Castings shall be boldly filleted at angles, and thearrises shall be sharp and perfect.

Malleable iron castings for railings posts shall be Grade No. 32510 and shall be galvanized with hot-dipped zinc coating in accordance with AASHTO M 232.

Ductile iron castings shall conform to the requirements of ASTM A-536, Grade 80-55-6, 65-45-12 or 60-40-18.

The dimension tolerance for gray iron castings is ±1/16 inch per foot (5.2 mm per meter) and the weight tolerance is ±5%.

All castings shall contain a manufacturer's heat number, lot number, or cast date. This identification shall be cast into the material at the time of manufacturer.

709.11-BLANK

709.12 - STRUCTURAL AND EYEBAR STEEL:

All structural steel for bridges shall conform to the applicable grade of AASHTO M270 that is specified in the Plans. When no specific grade is called for, AASHTO M270, Grade 36 shall be used. Non-designated structural steel in all other sections of the Specifications shall conform to AASHTO M183.

709.13-STEEL FORGINGS AND STEEL SHAFTING:

709.13.1-Steel Forgings: Steel forgings shall conform to AASHTO M 102, Class E. They shall be bored as specified in 615.4.9.2. A record of the annealing or normalizing changes shall be furnished showing the forgings in such charge, the melt or melts from which they were secured and the treatment they received.

709.13.2-Steel Shafting: Cold finished carbon steel shafting shall conform to AASHTO M169 Grades 1016 through 1030, inclusive, unless otherwise specified.

709.14-STEEL CASTINGS:

Steel castings shall conform to the requirements of AASHTO M 103, except steel produced by the converter process shall not be used. All steel castings shall be grade 65-35 (450-240). Sharp unfilleted angles or corners shall not be permitted.

709.15-COATED DOWEL BARS FOR PAVEMENT JOINT REINFORCEMENT:

Coated dowel bars shall meet the requirements of AASHTO M 254 with the following exceptions (numbers refer to subsections of AASHTO M 254):

3. **Materials**

3.1 The core material shall meet the requirements of 709.1.

4. **Dimensions**

4.2 The nonabraded thickness of the Type A coating shall be a minimum of 25 mils (635 µm).
The nonabraded thickness of the Type B coating shall be a minimum of 7 mils (175 µm).

6. **Sampling**

ADD THE FOLLOWING
Samples for Section 5.1 thru 5.4 shall be in a basket assembly.

7. **Documentation**

7.3 ADD THE FOLLOWING.
The coating applicator shall be certified as set forth in MP 709.01.51.
The coated dowel manufacturer shall be certified as set forth in MP 709.15.50.

7.7 ADD THE FOLLOWING:
Regardless of general acceptance of coated dowel bars by the Division when bar coatings are found to be perforated, cracked or otherwise damaged, including extensive coating damage at welds, prior to or during installation in the pavement, such bars will be rejected from use and shall be replaced with acceptable bars by the Contractor at no additional cost to the Division.

709.16-BLANK

709.17-WELDED AND SEAMLESS STEEL PIPE:

Black and galvanized steel pipe shall meet the requirements of ASTM A 53. When used for other than pressure pipe, the hydrostatic test will be waived. Pipe for ferrous metal railing shall be galvanized after fabrication in accordance with AASHTO M 111.

709.18-COPPER ALLOY CASTINGS FOR BEARING, EXPANSION, AND NAME PLATES FOR BRIDGES:

709.18.1-Copper Alloy Castings for Bearing and Expansion Plates for Bridges: The copper alloy castings for bearing and expansion plates for bridges shall be bronze conforming to the requirements of AASHTO M 107, Copper Alloy UNS Number C91100.

709.18.2-Copper Alloy Castings for Name Plates for Bridges: The copper alloy for name plates shall meet the requirements of ASTM B584, alloy C83600, C83450, C83800, C92200, or C92210. The mechanical requirements of the specification are waived

709.19-ROLLED COPPER-ALLOY BEARING AND EXPANSION PLATES FOR BRIDGES:

The rolled plates shall conform to the requirements of AASHTO M 108, Alloy C51000 or C51100.

709.20-FLASHING FOR CONSTRUCTION AND EXPANSION JOINTS:

709.20.1-Copper: Copper shall conform to the requirements of AASHTO M 138. Any type cold finished, suitable for the purpose intended, may be used. The sheet shall withstand being bent cold through 180°, flat upon itself, without fracture on the outside of the bent portion. Unless otherwise specified, thickness of the sheet shall be 0.022 in. (approximately 16 oz. per sq. ft.) (550 µm (approximately 4.88 kg per square meter)) with a tolerance of±0.002 in (50 µm).

709.20.2-Nickel-Copper Alloy: Nickel-copper alloy sheeting for flashing shall conform to the requirements of ASTM B 127. It shall be cold rolled, deep drawing and spinning quality. The thickness shall be as specified on the plans.

709.21-PIPES FOR FLOOR DRAINS AND DOWN-SPOUTS:

Cast iron pipe for floor drains and down-spouts shall conform to the requirements of ASTM A 74.

709.22-BLANK

709.23-STEEL BOLTS AND NUTS:

Material shall meet the requirements of ASTM A 307.

709.24-HIGH-STRENGTH BOLTS FOR STRUCTURAL STEEL JOINTS, INCLUDING SUITABLE NUTS AND HARDENED WASHERS:

709.24.1 - Bolts, Nuts and Washers: All bolts, nuts and washers shall bear the manufacturer's markings and all markings specified in the applicable AASHTO specifications. All bolts, nuts and washers supplied shall be domestic, as defined in 106.1.1.1, and the manufacturer and identification marks shall be registered in the Industrial Fastener Institute's Technical Information Report IFI-122.

709.24.2 - High-Strength Bolts: High-Strength bolts, black, galvanized or zinc rich coated, shall meet the requirements of AASHTO M 164 with the following exceptions. Zinc rich coated fasteners shall also meet the requirements of 709.24.10.

709.24.2.1- Blank

709.24.2.2: Proof load tests (ASTM F606, Method #1) are required for all bolts except as excluded in Section 6.2 of AASHTO M 164. Minimum frequency of tests shall be as specified in AASHTO M 164, paragraph 9.5.1.

709.24.2.3: Wedge tests on full size bolts (ASTM F606, paragraph 3.5) are required. If bolts are to be galvanized or zinc rich coated, tests shall be performed after galvanizing or coating. Minimum frequency of tests shall be specified in AASHTO M 164, paragraph 9.5.1.

709.24.2.4: If galvanized or zinc rich coated bolts are supplied, the thickness of the zinc coating shall be measured. Measurements shall be taken on the wrench flats or top of bolt head.

709.24.3 - Nuts: Nuts plain, galvanized or zinc rich coated shall meet the following requirements.

709.24.3.1: Nuts to be galvanized (hot-dip or mechanically galvanized), or to be zinc rich coated shall be grade DH or DH3 meeting AASHTO M 291 or shall be grade 2H meeting AASHTO M 292.

709.24.3.2: Plain (black) nuts shall be grade C, D or C3 meeting AASHTO M 291 or shall be grade 2 meeting AASHTO M 292 and shall have a minimum Rockwell hardness of 89 HRB (or Brinell hardness 180 HB). Plain nuts may also be supplied to grades listed in paragraph 709.24.3.1 above.

709.24.3.3: Nuts that are to be galvanized shall be tapped oversize the minimum amount required for proper assembly. The amount of overtap in the nut shall be such that the nut will assemble freely on the bolt in the coated condition and shall meet the mechanical requirements of the applicable AASHTO specification listed above and shall meet the requirements of the rotational-capacity test specified (the overtapping requirements of AASHTO M 291, paragraph 7.4 shall be considered maximum values instead of

minimum, as currently shown).

709.24.3.4: Galvanized and zinc rich coated nuts shall be coated with a lubricant containing a dye of any color that contrasts with the color of the coating.

709.24.3.5: Proof load tests (ASTM F606, paragraph 4.2) are required for all nuts. Minimum frequency of tests shall be as specified in AASHTO M 291, paragraph 9.3 or AASHTO M 292, paragraph 7.1.2.1. If nuts are to be galvanized or zinc rich coated, tests shall be performed after coating, overtapping and lubricating.

709.24.3.6: If galvanized or zinc rich coated nuts are supplied, the thickness of the coating shall be measured. Measurements shall be taken on the wrench flats.

709.24.4 - Hardened Washers: Hardened washers, plain, galvanized or zinc rich coated shall meet the requirements of AASHTO M 293 and the following:

709.24.4.1: If galvanized or zinc rich coated washers are supplied, hardness testing shall be performed after coating. (Coating shall be removed prior to taking hardness measurements).

709.24.4.2: If galvanized or zinc rich coated washers are supplied, the thickness of the coating shall be measured.

709.24.5 - Rotational Capacity Testing: Rotational-capacity tests are required and shall be performed on all black (plain), galvanized (after galvanizing) bolt, nut and washer assemblies by the manufacturer or distributor prior to shipping. Washers are required as a part of the test. The following shall apply:

709.24.5.1: Except as modified, the rotational-capacity test shall be performed in accordance with the requirements of AASHTO M 164.

709.24.5.2: Each combination of bolt production lot, nut lot and washer lot shall be tested as an assembly.

709.24.5.3: A rotational-capacity lot number shall be assigned to each combination of lots tested.

709.24.5.4: The minimum frequency of testing shall be two assemblies per rotational-capacity lot.

709.24.5.5: The bolt, nut and washer assembly shall be assembled in a

Skidmore-Wilhelm Calibrator or an acceptable equivalent device. For short bolts which are too short to be assembled in the Skidmore-Wilhelm Calibrator see Section 709.24.5.9.

709.24.5.6: The minimum rotation, from an intial condition (10% of the specified bolt proof load), shall be:

240° (⅔ turn) for bolt lengths up to and including 4 diameters.

360° (1 turn) for bolt lengths over 4 diameters up to an including 8 diameters.

480° (1⅓ turn) for bolt lengths over 8 diameters.

709.24.5.7: The tension reached at the above rotation shall be equal to or greater than 1.15 times the required installation tension. The installation tension and the tension for the turn test are shown below:

{ENGLISH}

Diameter (Inches)	⅝	¾	⅞	1	1⅛	1¼	1½
Required Installation Tension (kips)	19	28	39	51	56	71	103
Turn Test Tension (kips)	22	32	45	59	64	82	118

{METRIC}

Diameter (mm)	16	20	22	24	27	30	36
Required Installation Tension (kN)	91	142	176	205	276	326	475
Turn Test Tension (kN)	105	163	202	236	317	375	546

709.24.5.8: After the required installation tension listed above has been exceeded, one reading of tension and torque shall be taken and recorded. The torque value shall conform to the following:

Torque (T)	$\leq$	0.25 PD
Where:		
Torque (T)	=	measured torque (foot-pounds) (kN•m)
P	=	measured bolt tension (pounds) (kN)
D	=	bolt diameter (feet) (m)

709.24.5.9: Bolts that are too short to test in a Skidmore-Wilhelm Calibrator may be tested in a steel joint. The tension requirement of Section 709.24.5.7 need not apply. The maximum torque requirement of Section 709.24.5.8 shall be computed using a value P equal to the turn test tension shown in the Table in Section 709.24.5.7.

709.24.6 - Reporting of Test Results:

709.24.6.1: The results of all tests (including zinc coating thickness) required and in the appropriate AASHTO specifications shall be recorded on an appropriate document.

709.24.6.2: Location where tests are performed and date of tests shall be reported on the appropriate document.

709.24.7 - Witnessing of Tests: The tests need not be witnessed by an independent inspection agency. However, the manufacturer or distributor that performs the test shall certify that the results recorded are accurate. Independent of the above, the Engineer reserves the right to witness any and all tests as the Engineer deems necessary. The manufacturer or distributor will notify the Engineer prior to conducting any tests.

709.24.8 - Documentation:

709.24.8.1: Mill Test Report(s) (MTR) shall be furnished for all mill steel used in the manufacture of the bolts, nuts and washers. MTR shall indicate the place where the material was melted and manufactured.

709.24.8.2: Manufacturer Certified Test Report(s) (MCTR): The manufacturer of the bolts, nuts and washers shall furnish test reports (MCTR) for the items furnished. Each MCTR shall show the relevant information required in accordance with Section 709.24.6. The manufacturer performing the rotational-capacity test shall include on the MCTR:

a. The lot number of each of the items tested.
b. The rotational-capacity lot number as required in Section 709.24.5.3.
c. The results of the tests required in Section 709.24.5.
d. The pertinent information required in Section 709.24.6.2.
e. A statement that MCTR for the items are in conformance to this specification and the appropriate AASHTO specification.

f. The location where the bolt assembly components were manufactured.

709.24.8.3-Distributor Certified Test Report(s) (DCTR): The DCTR shall include MCTR above for the various bolt assembly components. The rotational-capacity test may be performed by a distributor (in lieu of a manufacturer) and reported on the DCTR. The DCTR shall show the results of tests required in Section 709.24.5; shall show the pertinent information required in Section 709.24.6.2 and shall show the rotational-capacity lot number as required in Section 709.24.5.3. The DCTR shall certify that the MCTR are in conformance to this specification and the appropriate AASHTO specifications.

709.24.9 - Shipping:

709.24.9.1: Bolts, nuts and washers from each rotational-capacity lot shall be shipped in the same container. If there is only one production lot number for each size of nut and washer, the nuts and washers may be shipped in separate containers. Each container shall be watertight and shall be permanently marked with a shipping label on the container lid and on the side of the container. The labels shall contain, as a minimum, the following information: quantity and description of contents, manufacturer's lot number for each item and the rotational - capacity lot number.

709.24.9.2: The appropriate MTR, MCTR or DCTR shall be supplied to the Engineer or representative prior to installation of any fasteners.

709.24.10 - Zinc Rich Coated Fasteners:

709.24.10.1: Fastener components shall be vapor degreased, blast cleaned to Steel Structures Painting Council (SSPC) condition SSPC-10 (near white) and spray coated with a high ratio water-based inorganic zinc rich primer meeting the requirements of Section 711.20.2 of the Standard Specifications. The primer utilized shall be included on the Division of Highways Approved List of Zinc Primers. Copies of the Approval List are available from WVDOH District Materials Officers or from the Materials Section in Charleston, WV.

709.24.10.2: Dry film thickness of the zinc rich primer shall be 2 mils (50 µm) minimum and 4 mils (100 µm) maximum.

709.25-STEEL SHELLS OR CASINGS (DRIVEN WITHOUT MANDREL) FOR CAST-IN-PLACE PILES:

Steel shells or casings shall be composed of basic open hearth steel having a tensile strength of not less than 50,000 psi (345 MPa). The thickness of metal shall be as indicated on the Plans. The tips (small end) shall be equipped with a steel driving point securely fastened to the shell and the entire shell shall form one integral water-tight unit. Shells shall be tapered or step-tapered from top

to bottom.

Any shell proposed for use shall be approved by the Engineer before driving.

709.26 THROUGH 709.28-BLANK

709.29-ZINC COATED STEEL SHEETS FOR USE IN MANUFACTURING TRAFFIC SIGNS:

The zinc coated steel sheets shall be 16 gage (USS) and shall conform to the requirements of ASTM A 525.

The sheets shall be resquared. They shall be furnished with a galvanized coating, Class 2.00.

The surface of the sheets shall be clean, free of oil, soot, dirt, scale, and other foreign material. They shall be protected in transit and shall be suitable for painting without cleaning or processing in any manner upon receipt by the Division.

709.30-CAST IRON SOIL PIPE AND FITTINGS:

Cast iron soil pipe and fittings shall conform to the requirements of ASTM A 74.

709.31-ALUMINUM ALLOY EXTRUSIONS AND ALUMINUM ALLOY EXTRUDED TUBE:

Aluminum alloy extrusions and extruded tube shall conform to ASTM B 221, alloy 6061, temper condition T6.

709.32-ALUMINUM ALLOY STANDARD STRUCTURAL SHAPES:

Aluminum alloy standard structural shapes, rolled or extruded, shall conform to ASTM B 308, alloy 6061, temper condition T6.

709.33-ALUMINUM ALLOY DRAWN TUBE:

Aluminum alloy drawn tube shall conform to ASTM B 210, alloy 6061, temper condition T6.

709.34-ALUMINUM ALLOY PIPES:

Aluminum alloy pipe shall conform to ASTM B 241, alloy 6061, temper condition T6.

709.35-ALUMINUM ALLOY RIVETS:

Aluminum alloy rivets shall conform to Military Specifications MIL-R-5674; grade and head style shall be as specified by the Engineer.

709.36-ALUMINUM ALLOY BOLTS, NUTS AND SET SCREWS:

Aluminum alloy bolts and set screws shall be made from rod conforming to ASTM B 211, alloy 2024, temper condition T4. The aluminum alloy nuts shall be made form rod conforming to either ASTM B 221, alloy 6061, temper

condition T6 or ASTM B 211, alloy 6061, temper condition T6.

Bolt head and nuts shall conform to the American Standard Regular Hexagon, ASA Specifications B 18.2 with the following modification: the width across the flats and the width across the corners may exceed the maximum given in the specification tables by an amount no greater than 20 percent of the difference between the maximum and minimum values given in the tables.

Threads shall conform to American Standard Coarse Thread Class 2. The finished product shall be in the fully heat-treated and aged condition. Anchor bolts shall be given a clear anodic coating at least 0.0002 in (5 µm). thick. Exposed nuts and washers need not be given as anodic coating.

709.37-ALUMINUM ALLOY WASHERS:

Aluminum alloy washers shall be made from sheet conforming to ASTM B 209, Alclad 2024, temper condition T3 or T4 depending upon the thickness supplied.

709.38-BLANK

709.39-ALUMINUM ALLOY SAND CASTINGS:

Aluminum alloy sand castings shall conform to **Table 658.4.3**.

709.40-ALUMINUM ALLOY SHIM MATERIAL:

Aluminum alloy shims shall be made from sheet or plate conforming to ASTM B 209, alloy 1100, temper condition 0.

709.41-ALUMINUM FILLER METAL FOR WELDING:

Aluminum filler metal for welding shall conform to ASTM B 285, alloy ER 4043.

709.42-GALVANIZED PIPE OR TUBING FOR HORIZONTAL DRAINS:

709.42.1-General: Horizontal drains may be of galvanized welded or seamless steel pipe, or galvanized tubing, conforming to the requirements prescribed.

The outside diameter shall be a nominal diameter of 2 inches (50 mm) or greater, and the wall thickness shall be a minimum of 0.043 in. (1 mm) The material shall be perforated. Perforations shall consist of two rows of 3⁄16 in. ±1/32 in. (5 mm ±1 mm) diameter holes along the length of the pipe or tubing. The holes in each row shall be on 2 inches ±¼ in. (50 mm ±6 mm) centers. The row shall be 110 deg apart.

The material may be furnished in random or regular lengths.

709.42.2-Galvanized Welded or Seamless Steel Pipe:

Galvanized welded or seamless steel pipe shall conform to the requirements

of ASTM A 53. The hydrostatic test will be waived.

709.42.3-Galvanized Tubing: Galvanized tubing shall be circular in cross section with a welded seam. The base metal shall conform to the requirements of Table 1, AASHTO M 218M. The outside surface of the weld shall be metalized.

709.43 THROUGH 709.44-BLANK

709.45-GALVANIZED STEEL GUARDRAIL POSTS:

Steel guardrail posts shall be fabricated from steel meeting the requirements of AASHTO M 183 or fabricated in accordance with ASTM A 769, Grade 40. They shall be of a section, length and weight as specified on the Plans. The weight shall not be less than 97.5 percent of that specified.

Galvanizing shall be in accordance with AASHTO M 111, with a minimum of 2 oz. per square foot (600 grams per square meter).

709.46-STEEL POSTS, POST BRACES AND GATE FRAMES FOR RIGHT-OF WAY FENCE:

End, pull, corner, gate, intermediate assembly, special length line posts, post braces and gate frames shall be either (a) galvanized steel pipe meeting the requirements of ASTM A 53, with hydrostatic pressure test requirements waived, or (b) triple-coated steel pipe meeting the requirements for Class 2 pipe in AASHTO M 181. Either type may be used unless one type is specifically called for in the contract. Pipe members shall have the dimensions and weights called for on the Plans. In addition, for chain link fence only, roll formed members, having the dimensions and weights called for on the Plans and meeting the applicable requirements in 712.8 of the Specifications, may be used in lieu of pipe posts and pipe braces as shown on the Plans.

Line posts for farm-field fence shall conform to the requirements of AASHTO M 281. Line posts for chain-link fence shall conform to the requirements shown on the Plans. All line posts shall be galvanized. A tolerance of five percent in weight will be allowed on all fence posts.

709.47-BLANK

709.48-CADMIUM COATED MATERIALS:

Cadmium coated (electrodeposited) steel articles, steel hardware, nuts, bolts, etc. shall meet the requirements of ASTM B766.

709.49-SHEET LEAD:

Sheet lead shall conform to the requirements of ASTM B 29.

709.50-STEEL PILE POINTS:

Steel pile points may be either ASTM A27 Grade 65/35 cast steel or ASTM A148 Grade 90/60. Pile points will be approved by the Materials Control, Soil